

# REMARKS

This Response is submitted in reply to the non-final Office Action mailed on July 15, 2009. No fee is due in connection with this Response. The Director is authorized to charge any fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 112857-447 on the account statement.

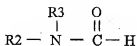
Claims 18-19 and 21-35 are pending in this application. Claims 1-17 and 20 were previously canceled without prejudice or disclaimer, and Claims 22-34 were previously withdrawn from consideration. In the Office Action, Claims 18-19, 21 and 35 are rejected under 35 U.S.C. §103. For at least the reasons set forth below, Applicants respectfully submit that the rejection should be withdrawn.

In the Office Action, Claims 18-19, 21 and 35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent Publication No. 61-151241 to Miyake et al. ("*Miyake*"). For at least the reasons set forth below, Applicants respectfully submit that *Miyake* fails to disclose or suggest each and every element of independent Claim 18 and Claims 19, 21 and 35 that depend therefrom.

Independent Claim 18 recites, in part, a proton conductor, including an impregnated complex composed of: a first compound having a first structural part having a first formula:



where R1 represents a component including carbon, X represents a protoic dissociation group, and  $n \leq 1$ ; and a second compound having a second structural part having a second formula:



where R2 and R3 represent a component including carbon or hydrogen, respectively, wherein a number of moles of the first compound is a, a number of moles of the second compound is b, and a ratio of the number of moles b to the number of moles of the protoic dissociation group (a×n) is greater than or equal to 10 and less than or equal to 30, wherein the first compound is a film into which the second compound is impregnated. In contrast, *Miyake* fail to disclose every element of the present claims.

For example, *Miyake* fails to disclose or suggest a proton conductor as recited, in part, by independent Claim 18. The Patent Office asserts that *Miyake* discloses “an ion exchange membrane (proton conductor) composed of a carboxyl group-containing polymer.” See, Office Action, page 3, lines 4-5. However, contrary to the Patent Office’s assertion, *Miyake* is entirely directed to a cationic exchange membrane, rather than a proton conductor. See, *Miyake*, Claim 1; page 9, lines 1-4. Although *Miyake* describes its ion exchange membrane as including carboxylic “acid” groups, *Miyake* teaches that the carboxylic group is an alkali metal salt or an ammonium salt. See, *Miyake*, Claims 9 and 17; page 5, lines 22-23; page 8, lines 1-4 and 10-21. One of ordinary skill in the art would understand that alkali metals and ammonium are cations, not protons. Furthermore, because the carboxylic groups of *Miyake* contain such cations, one of ordinary skill in the art would understand that the ion exchange membrane of *Miyake* merely conducts such cations, rather than protons. As such, Applicants respectfully submit that *Miyake* fails to disclose a proton conductor as required, in part, by the present claims.

Moreover, *Miyake* fails to disclose or suggest a proton conductor wherein a number of moles of the first compound is a, a number of moles of the second compound is b, and a ratio of the number of moles b to the number of moles of the protoic dissociation group ( $a \times n$ ) is greater than or equal to 10 and less than or equal to 30 as recited, in part, by independent Claim 18. The Patent Office admits that *Miyake* fails to disclose the claimed molar ratio range. See, Office Action, page 3, lines 18-20. Nevertheless, the Patent Office asserts that “the number of moles b and proton dissociation group ( $a \times n$ ) of *Miyake* is expected to be similar to the claimed moles since *Miyake* teaches the same or substantially similar ingredients prepared by the same method (impregnation).” See, Office Action, page 4, lines 11-14. However, as discussed previously, *Miyake* does not teach the same or substantially similar ingredients since it is entirely directed to a cation exchange membrane rather than a proton conductor. See, *Miyake*, column Claims 1, 9 and 17; page 5, lines 22-23; page 8, lines 1-4 and 10-21; page 9, lines 1-4.

In addition, one skilled in the art would understand that the number of moles of the second compound impregnated into the first compound varies depending on conditions such as: (1) the concentration of the second compound in the solution into which the first compound is immersed; (2) the immersion temperature; and (3) the immersion time. Although *Miyake* discloses immersing the membrane for 1 min to 100 h at a temperature of 0-90 °C such that the entire membrane is impregnated with 0.1-50 wt % of the solvent, nowhere does *Miyake* disclose the ratio of the number of moles of the solvent to the number of moles of the carboxylic groups.

See, *Miyake*, page 7, lines 12-23. In fact, *Miyake* never discloses the number of moles of carboxylic groups on the membrane. Therefore, one of ordinary skill in the art could not determine the molar ratio of the amide solvent of *Miyake* to the carboxylic groups of the membrane and, thus, *Miyake* fails to disclose, either expressly or inherently, that a ratio of the number of moles b to the number of moles of the protoic dissociation group (a×n) is greater than or equal to 10 and less than or equal to 30 in accordance with the present claims.

Furthermore, Applicants respectfully submit that the claimed range would not have been obvious to one of ordinary skill in the art. The Patent Office asserts that “the modification necessary to meet the claimed limitations. . . would have been within the purview of the skilled artisan through routine experimentation.” See, Office Action, page 4, lines 16-19. However, Applicants respectfully note that “[a] particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.” See, M.P.E.P. § 2144.05(B) (2009). *Miyake* is entirely directed to improving membrane handling strength and decreasing the occurrence of creases and dimensional change by immersing the membrane in or coating the membrane with a solvent. See, *Miyake*, page 6, lines 3-7. Nowhere does *Miyake* disclose that the ratio of the number of moles of solvent to the number of moles of carboxylic groups affects the conductivity of the membrane. Moreover, *Miyake* teaches that if its weight range of 0.1-50 % solvent by weight of the membrane “is strayed from, the objective of the present invention will absolutely not be achieved, or the effect thereof will be noticeably lower.” See, *Miyake*, page 7, lines 20-23. Thus, Applicants respectfully submit that one skilled in the art would have no reason to modify or optimize the molar ratio of the solvent to the carboxylic groups of *Miyake* to arrive at the present claims.

Applicants also respectfully submit that the claimed mole ratios achieve unexpected results over values outside the claimed range. Such results are demonstrated in the Specification at, for example, page 4, paragraph 58; page 5, paragraph 59; page 10, Tables 1-2; and Figs. 1 and 5-7. As clearly shown in Figure 1, the proton conductivity dramatically decreases from 0.0004 to approximately 0.0002 when the molar ratio is decreased below 10. See, Specification, Fig. 1. Similarly, the proton conductivity decreases from 0.00045 to approximately 0.000325 when the molar ratio is increased above 30. Therefore, Applicants respectfully submit that the claimed range achieves unexpected results and is thus not obvious.

Accordingly, Applicants respectfully request that the rejection of Claims 18-19, 21 and 35 under 35 U.S.C. §103(a) to *Miyake* be withdrawn.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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